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10/792,054	03/02/2004	Avgerinos V. Gelatos		4738

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EXAMINER	
PAIK, SANG YEOP	
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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/792,054
Filing Date: March 02, 2004
Appellant(s): GELATOS ET AL.

Ashok K. Janah
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 5/15/2006 appealing from the Office action mailed 6/9/2005.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,423,949	Chen	07-2002
5,916,370	Chang	06-1999
4,090,851	Berkman et al	05-1978
6,046,758	Brown	04-2000

6,630,413	Todd	10-2003
6,469,283	Burkhart et al	10-2002
6,376,808	Tachikawa et al	04-2002
5,851,298	Ishii	12-1998
6,009,831	Hwang	01-2000

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-5, 7, 8, 11-15 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al (US 6,423,949) in view of Chang (US 5,916,370) or Berkman et al (US 4,090,851), and Brown et al (US 6,046,758) or Todd (US 6,630,413). Chen shows a substrate processing chamber with a substrate support having a ceramic block made of aluminum nitride with a pocket to receive a substrate therein, a plurality of independently controlled resistance heaters having 2-4 ohms disposed in the ceramic block, the heater leads extending out of the ceramic block and extending through a post. However, Chen does not show the claimed ceramic coating comprising an amorphous Si-H-N-O compound. Chang show a ceramic support provided with a protective coating to further protect the ceramic support. Berkman also shows it is known in the art to provide a protective coating such as silicon nitride over a ceramic support. Berkman also teaches that silicon nitride provide good mechanical and chemical resistance as well as good thermal conductivity. Brown shows an amorphous protective coating comprising Si-H-N-O compound to produce a highly wear and abrasion resistant coating. Brown further shows that the protective coating can be in the range of .5-20 microns. Todd also shows the amorphous silicon

nitride material having Si in the range of 40-99.5 wt %, N in the range of .25-40 wt %, O in the range of 0-49.9 wt %, and H in the range of 20% or less of the silicon nitride. It would have been obvious to one of ordinary skill in the art to adapt Chen with the teachings of Chang and Berkman to provide the ceramic block with a protective coating including silicon nitride to further enhance the mechanical and chemical resistance, and further adapt with the teachings of Brown and Todd with the coating comprising Si, H, H and O to produce a mechanically and chemically strong protective coating.

Claims 6, 9 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen in view of Chang or Berkman, and Brown or Todd as applied to claims 1-5, 7, 8, 11-15 and 17 above, and further in view of Burkhart et al (US 6,469,283) or Tachikawa et al (US 6,376,808). Chen in view of Chang or Berkman, and Brown or Todd shows the structure claimed except an electrode in the ceramic block. Burkhart and Tachikawa show it is well known in the art to provide an electrode in the ceramic body. In view of Burkhart or Tachikawa, it would have been obvious to one of ordinary skill in the art to adapt Chen, as modified by Chang or Berkman, and Brown or Todd, with an electrode in the ceramic body to electrically attract or chuck an object such as a wafer to the heating surface of the ceramic support.

Claims 10, 18-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen in view of Chang or Berkman, and Brown or Todd as applied to claims 1-5, 7, 8, 11-15 and 17 above, and further in view of Ishii (US 5,851,298) or Hwang (US 6,009,831). Chen in view of Chang or Berkman, and Brown or Todd shows the structure claimed including a process chamber, a gas distributor, a gas exhaust, and the controller having programs to independently control the heating elements. However, Chen does not show a gas energizer such as RF generator

or microwave generator. Ishii shows it is known in the art to provide a microwave generator to generate microwave that would consequently generate magnetic field with the magnetic coil with the process chamber to excite the gas introduced therein. Ishii further shows using the electrodes in the ceramic block for the RF electrodes. Hwang also shows it is known in the art to use the showerhead in the gas processing chamber to as the RF electrode and the electrode in the ceramic body support substrate as another RF electrode to generate the RF there between. In view of Ishii or Hwang, it would have been obvious to one of ordinary skill in the art to adapt Chen, as modified by Chang or Berkman, and Brown or Todd, with the gas energizers such as the RF or microwave generator to excite or energize the gas in the chamber to further enhance the desired process.

(10) Response to Argument

The applicant argues that since Chen teaches a susceptor having an exposed surface of an aluminum nitride without any coating, and since such susceptor works fine in a plasma environment, there is no motivation to provide a coating for the disclosed aluminum nitride susceptor. This argument is not deemed persuasive. First, Chen does not teach away the use of a protective coating, and secondly, to one of ordinary skill in the art, making an improvement over an already finely working product into a superior working product would be obvious to not only improve the effectiveness of its own device but also to produce superior products.

With respect to Chang, the applicant argues Chang shows a protective diamond film coating and not the claimed coating of amorphous Si-H-N-O compound and that there is no motivation to use the claimed coating. The applicant argues Chang further teaches away the claimed invention as Chang teaches that exposed silicon nitride is undesirable in the chamber

because "the silicon nitride may flake and introduce unwanted particulates into the processing chamber." The applicant believes such disclosure in Chang teaches away from a protective coating of amorphous Si-H-N-O compound. This argument is not deemed persuasive. It is noted that the silicon nitride is not the same as the claimed Si-H-N-O compound, and there is no basis to believe Chang would teach away the use of the claimed compound. But more importantly, the silicon nitride disclosed in Chang is not related to the protective coating itself of a susceptor. The prior art example shown in column 1, lines 34-41, relates to the silicon nitride as a deposition film being deposited on the silicon carbide coated graphite susceptor. The silicon nitride relates to a working material that is being processed in a chamber and does not relate to having such silicon nitride as a protective coating layer of a ceramic susceptor. The susceptor is already shown to have a protective coating such as a silicon carbide. To make an improvement over the prior art example, Chang shows the use of a diamond film. The applicant also argues that Chang does not use the resistance heater, but it is noted that Change is not applied to teach the resistance heater but the use of a protective coating of a susceptor that is subject to chemical contaminations in a high temperature heating environment.

With respect to Berkman, the applicant argues that Berman is non-analogous art because Berkman teaches the art of forming die crucibles whereas the claimed invention relates to the art of substrate supports for substrate processing chambers. This argument is not deemed persuasive. Berkman is in the same field of endeavor which is in the field of protecting ceramic substrates in a chemically reactive environment, and having such protective coating is also reasonably pertinent to the problem with which the applicant is concerned with which is to prevent chemical contaminations to the ceramic substrate devices exposed to high temperatures.

In view of Chang or Berkman, it would have been obvious to one of ordinary skill in the art to adapt Chen to provide the ceramic block with a protective coating to further enhance the mechanical and chemical resistance when exposed to a high heating temperature in a chemically reactive environment to prevent contaminations to the ceramic heater of Chen. For the particular claimed material for the protective coating layer such as the claimed Si-H-N-O compound, Brown or Todd reference is applied.

With respect to Brown and Todd, the applicant argues they are non-analogous art since they do not show the substrate support for substrate processing chamber. This argument is not deemed persuasive. Both Brown and Todd show the same field of endeavor which involves the field of the protective coatings for the ceramic substrates that are subject to high temperatures and chemically reactive environments. Brown shows that its device is exposed to degrading environmental environments such as dust, high humidity and acidic vapors and chemical vapors, and Todd shows the chemical vapor depositions as well as the plasma processing. These showings clearly teach the analogous art with that of the disclosed invention, and since Brown and Todd clearly show the claimed Si-H-N-O compound, it would have been obvious to one of ordinary skill in the art to adapt Chen in view of Chang or Berkman, with the claimed protective coating for a more mechanically and chemically strong protective coating.

With respect to Burkhart, Tachikawa, Ishii and Hwang, the applicant argues they do not show the claimed coating comprising the amorphous Si-H-N-O compound and do not cure the deficiencies of the Chen references in view of Chang or Berkman, and Brown or Todd. It is noted, however, that Burkhart, Tachikawa, Ishii and Hwang were not applied to teach such

material but the claimed electrode, RF or microwave generators as stated in the grounds of rejection.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Sang Paik

SANG PAIK
PRIMARY EXAMINER

Conferees:

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Tom Hughes